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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/821,832

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Rajiv K. Grover

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EXAMINER

CAO, DIEM K

ART UNIT

PAPER NUMBER

2194

NOTIFICATION DATE

DELIVERY MODE

04/29/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/821,832	Applicant(s) GROVER ET AL.	
	Examiner DIEM K. CAO	Art Unit 2194	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-26 are pending. Applicant has amended claims 1, 6, 11 and 15.
2. In view of the Appeal Brief filed on 2/6/2009, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

- (1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,
- (2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-2, 4, 6-7, 9, 11-14, 16-21, 23-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cherian et al (US 7,225,242 B2) in view of Tate et al (IBM SAN Survival Guide).**

As to claim 1, Cherian teaches a computer program product including computer-readable storage with a computer program, the computer program executing a computer process on a computer system (a method and system ... in a SAN; col. 4, lines 12-15, lines 38-49), the computer process:

identifying a plurality of storage devices to be configured in a storage network (a LUN ownership map is retrieved ... Storage Device Y; col. 5, lines 8-13, Storage Device X, Storage Device Y; Fig. 1 and col. 4, lines 40, lines 47-55);

identifying a number of host port Logical Unit Numbers (LUNs) which are configured on each of the storage devices (A LUN ownership map is retrieved ... logical ownership over one of the LUNs in Storage Device Y; col. 5, lines 8-13 and The physical storage ... logical Storage units ... logical storage unit itself ... LUN; col. 4, lines 41-51);

identifying a number of host port connections to the storage devices (Each LUN 16 is logically ... over multiple LUNs; col. 4, line 56 – col. 6, line 4 and Fig. 1); and

for each host port connection, determining actual loading of input/output (IO) jobs for each of the storage devices based at least in part on execution throttle level of each host that has logical ownership over a LUN of the respective storage controller (At step 22 ... each storage controller of the SAN; col. 5, lines 13-39).

Cherian does not explicitly teach queue depth for each of the host port LUNs. However, Cherian teaches the server's execution throttle is the maximum number of I/O commands that a server can have outstanding, the execution throttle is typically controlled by configuration setting in the HBA device driver (col. 1, line 65 – col. 2, line 5), each LUN is logically normally owned

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by a single host server, as an example, Server A may have logical ownership over LUN 0001 in Storage Device X (col. 4, lines 56-61), and calculating the execution throttle level for each LUN (col. 4, lines 7-17). Tate teaches lun-queue-depth parameter for the HBA is defined as the default value lpfs will use to limit the number of outstand commands per FCP LUN, this value is global, affecting each LUN recognized by the driver, but may be overridden on a per-LUN basis (pages 161-162).

It would have been obvious to one of ordinary skill in the art, based on the definitions provided by Cherian and Tate, the queue depth for each of the host port LUN is the same as the execution throttle taught by Cherian.

As to claim 2, Cherian teaches wherein the computer process further comprises determining actual loading for each of the storage devices based at least in part on a number of host groups in the storage network (Servers (A+B+C), Servers (B+C+D+E); col. 5, lines 23-27).

As to claim 4, Cherian teaches wherein the computer process further uses a loading factor to determine if the actual loading for each of the storage devices exceeds a maximum loading (col. 5, lines 21-44).

As to claim 6, Cherian teaches a computer program product including computer-readable storage with a computer program, the computer program for executing a computer process on a computer system (a method and system ... in a SAN; col. 4, lines 12-15, lines 38-49), the computer process:

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identifying a plurality of storage devices to be configured in a storage network (a LUN ownership map is retrieved ...Storage Device Y; col. 5, lines 8-13, Storage Device X, Storage Device Y; Fig. 1 and col. 4, lines 40, lines 47-55);

identifying a number of host port connections to the storage devices (Each LUN 16 is logically ... over multiple LUNs; col. 4, line 56 – col. 6, line 4 and Fig. 1); and

for each host port connection, determining actual loading for each of the storage devices based at least in part on an execution throttle level of each host that has logical ownership over a LUN of the respective storage controller (At step 22 ... each storage controller of the SAN; col. 5, lines 13-39).

Cherian does not teach queue depth for each of the host port connections. However, Cherian teaches the server's execution throttle is the maximum number of I/O commands that a server can have outstanding, the execution throttle is typically controlled by configuration setting in the HBA device driver (col. 1, line 65 – col. 2, line 5), each LUN is logically normally owned by a single host server, as an example, Server A may have logical ownership over LUN 0001 in Storage Device X (col. 4, lines 56-61), and calculating the execution throttle level for each LUN (col. 4, lines 7-17). Tate teaches lun-queue-depth parameter for the HBA is defined as the default value lpfs will use to limit the number of outstand commands per FCP LUN, this value is global, affecting each LUn recognized by the driver, but may be overridden on a per-LUN basis (pages 161-162).

It would have been obvious to one of ordinary skill in the art, based on the definitions provided by Cherian and Tate, the queue depth for each of the host port LUN is the same as the execution throttle taught by Cherian.

As to claims 7 and 9, see rejections of claims 2 and 4 above.

As to claim 11, see rejection of claim 1 above. Cherian as modified by Tate further teaches:

identifying a queue depth for each of the host port LUNs (see Cherian: execution throttle levels or command ... are summed; col. 5, lines 14-17, inherently, execution throttle of each server is identified) and (see claim 1 above for teaching of LUN); and

accepting the storage device configuration if the actual loading for the storage device is no more than a maximum loading for the storage device (see Cherian: a verification test is performed to determined ... storage controller; col. 5, lines 14-28 and col. 6, lines 1-4).

As to claim 12, Cherian as modified teaches wherein automatically determining actual loading for the storage device is also based at least in part on a number of host paths connected to the storage device (see Cherian: col. 5, lines 29-37).

As to claim 13, Cherian teaches wherein automatically determining actual loading for the storage device port is also based at least in part on a number of LUNs configured for the storage device (see Cherian: col. 5, lines 7-17).

As to claim 14, see rejection of claim 2 above.

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As to claim 16, Cherian does not explicitly teach automatically determining actual loading for a plurality of backend LUNs connected to the storage device. However, Cherian teaches automatically determining actual loading for each of LUNs connected to the storage device. Although Cherian does not teach backend LUNs, it would have been obvious to one of ordinary skill in the art that the system of Cherian could implement backend LUNs, and actual loading for each backend LUNs would also be determined.

As to claim 17, Cherian teaches iteratively determining actual loading for a plurality of storage devices in the storage network (execution throttle levels or command ... are summed; col. 5, lines 14-17, inherently, execution throttle of each server is identified; col. 4, lines 14-28).

As to claim 18, Cherian and Tate does not teach wherein the maximum loading for the storage device is based on a loading factor for test environments. However, the maximum loading in the system of Cherian is for production environment, it would have been obvious to one of ordinary skill in the art, prior to production, test must be performed to ensure that the system will perform with minimum error, thus the maximum loading of each storage device can be obtained after testing period.

As to claim 19, Cherian does not explicitly teach wherein the loading factor is in the range of about 80% to 90% of a service queue depth for the storage device. However, Cherian teaches the loading factor must be less than the service queue depth for the storage device (col. 5, lines 17-28). Although Cherian does not explicitly teach the range of about 80%-90%, it would

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have been obvious to one of ordinary skill in the art that the range should not be 100% of the service queue depth, and should not be too low, thus, 80-90% would be a safe choice for the system.

As to claim 20, see rejection of claim 6 above. Cherian further teaches the number of input/output (IO) jobs being issued by a host do not exceed the queue depth of a service queue (col. 5, lines 17-28).

As to claim 21, see rejection of claim 2 above.

As to claim 23, see rejection of claim 16 above.

As to claim 24, see rejection of claim 17 above.

As to claim 26, Cherian teaches wherein device loading is a function of queue depth for each target port, number of host paths connected to the target port, and queue depth for each host port (number of servers connected to each storage device, number of LUN for each storage device, execution throttle for each server; col. 5, lines 7-28).

5. Claims 3, 5, 8, 10, 15, 22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cherian et al (US 7,225,242 B2) in view of Tate et al (IBM SAN Survival Guide) further in view of Nahum (U.S. 2004/0078599).

As to claim 3, Cherian and Tate do not teaches wherein the computer process further comprises determining actual loading for each of the storage devices based at least in part on a number of LUN security groups in the storage network.

However, Nahum discloses a system in which LUN security groups are used (page 2, paragraph 18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of LUN security groups of Nahum's system in Cherian and Tate's invention because having LUN security groups would allow for greater reliability in assuring that all of the devices were in the storage network legally and not taking into account component that are not part of the network in calculating loading times.

As to claim 5, Cherian and Tate do not teaches wherein the computer process further simplifies host groups and LUN security groups into virtual connections for analysis.

Nahum teaches the computer process further simplifies host group and LUN security groups into virtual connections for analysis (page 2, paragraph 18).

See claim 3 above for reason to apply the teaching of Nahum to the system of Cherian and Tate.

As to claims 8 and 10, see rejections of claims 3 and 5 above.

As to claim 15, see rejection of claim 3 above..

As to claim 22, see rejection of claim 15 above.

As to claim 25, see rejections of claim 26 and 3 above.

Response to Arguments

6. Applicant's arguments with respect to claims 1-26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO 892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DIEM K. CAO whose telephone number is (571)272-3760. The examiner can normally be reached on Monday - Friday, 7:30AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DC

April 14, 2009

/Li B. Zhen/

Primary Examiner, Art Unit 2194